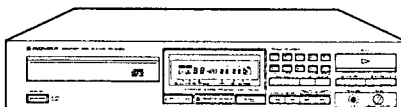


Service Manual



ORDER NO.
ARP1330

COMPACT DISC PLAYER

PD-5050

PD-5050-S

MODEL PD-5050 AND PD-5050-S COMES IN TWO VERSIONS DISTINGUISHED AS FOLLOWS:

Type	Applicable model		Power requirement	Export destination
	PD-5050	PD-5050-S		
HEM	○	○	AC220V, 240V (switchable)	European continent
HB	○	—	AC220V, 240V (switchable)	United Kingdom

- This service manual is applicable to the HEM and HB types.
- As to the HB type, please refer to page 75.
- Ce manuel d'instruction se réfère au mode de réglage en français.
- Este manual de servicio trata del método ajuste escrito en español.

PIONEER ELECTRONIC CORPORATION 4-1, Meguro 1-Chome, Meguro-ku, Tokyo 153, Japan
PIONEER ELECTRONICS SERVICE INC. P.O. Box 1760, Long Beach, California 90801 U.S.A.
PIONEER ELECTRONICS OF CANADA, INC. 505 Cochrane Drive, Markham, Ontario L3R 6B8 Canada TEL: [416] 479-4411
PIONEER ELECTRONIC [EUROPE] N.V. Keetberglaan 1, 2740 Beveren, Belgium TEL: 03/775 · 28 · 08
PIONEER ELECTRONICS AUSTRALIA PTY. LTD. 178-184 Boundary Road, Braeside, Victoria 3195, Australia TEL: [03] 580-9911

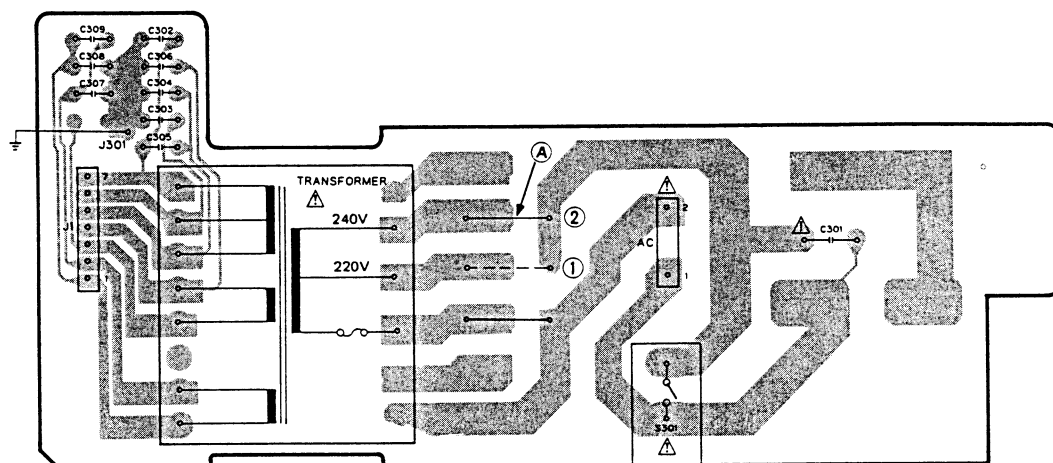
MT © MAR. 1987 Printed in Japan

For PD-5050

- Line voltage selection (for HEM and HB types)
1. Disconnect the AC power cord.
 2. Remove the bonnet case.
 3. Change the position of the jumper **(A)** as follows.

Voltage	Jumper (A) position
220V	①
240V	②

TRANSFORMER BOARD ASSEMBLY

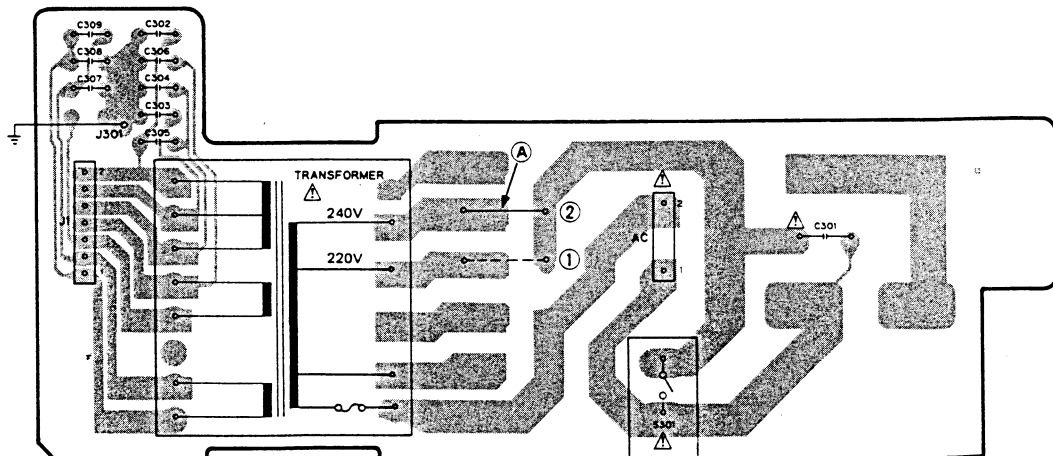


For PD-6050

- Line voltage selection (for HEM and HB types)
1. Disconnect the AC power cord.
 2. Remove the bonnet case.
 3. Change the position of the jumper **(A)** as follows.

Voltage	Jumper (A) position
220V	①
240V	②

TRANSFORMER BOARD ASSEMBLY



THE FIGURE OF THE LINE VOLTAGE SELECTION IN THIS MANUAL IS INCORRECT.

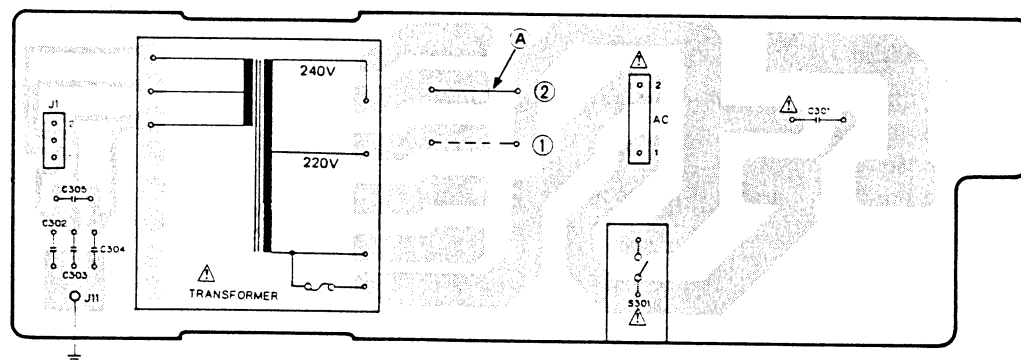
PLEASE REPLACE IT WITH THE FOLLOWING REVISION.

For PD-4050

- Line voltage selection (for HEM and HB types)
 1. Disconnect the AC power cord.
 2. Remove the bonnet case.
 3. Change the position of the jumper (A) as follows.

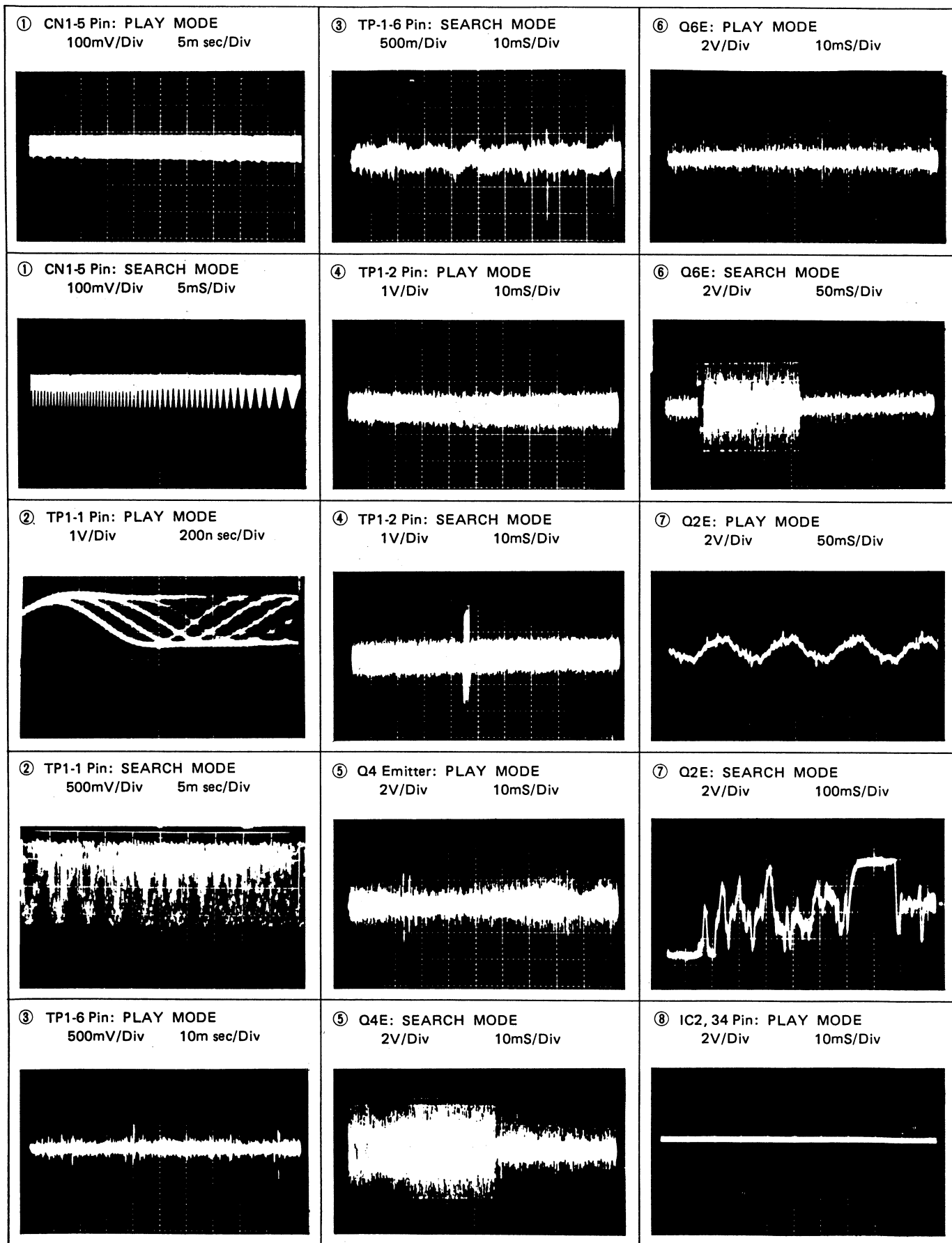
Voltage	Jumper (A) position
220V	①
240V	②

TRANSFORMER BOARD ASSEMBLY

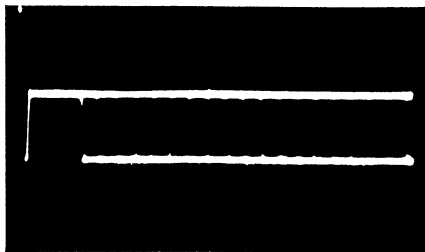


WAVE FORMS

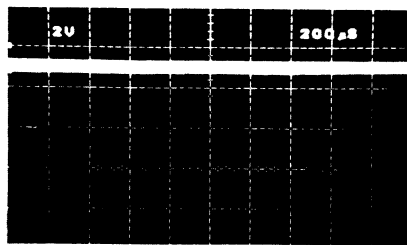
NOTE: The encircled numbers denote measuring points in the circuit and pattern diagrams.



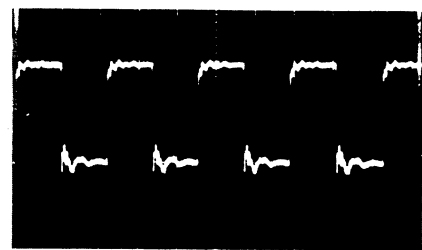
⑨ IC1 27 Pin: PLAY MODE
2V/Div 500n sec/Div



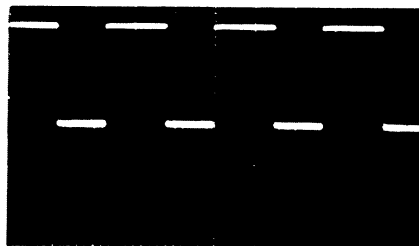
⑫ TP2-1: PLAY MODE
2V/Div 200μS/Div



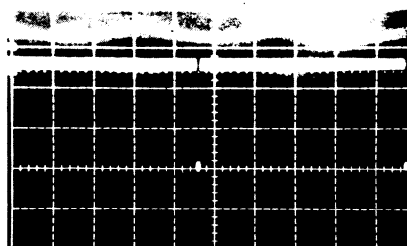
⑬ IC3-76: STOP MODE
2V/Div 200nS/Div



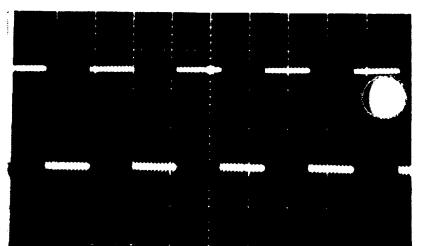
⑩ IC3-4: PLAY MODE
2V/Div 50μS/Div



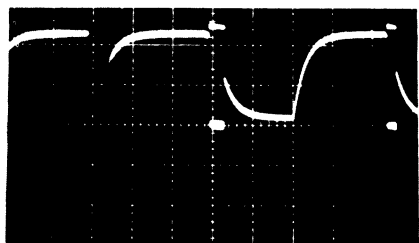
⑫ TP2-1: SEARCH MODE
2V/Div 20mS/Div



⑪ IC3-79: STOP MODE
2V/Div 5μS/Div



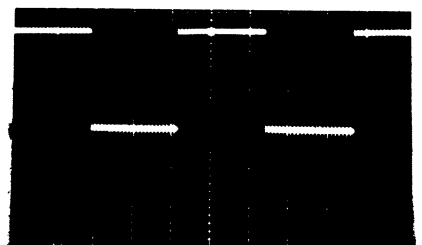
⑩ IC3-4: SEARCH MODE
2V/Div 100mS/Div



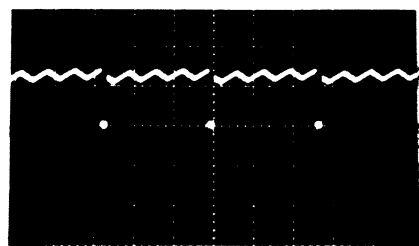
⑬ IC2-38: PLAY MODE
2V/Div 200μS/Div



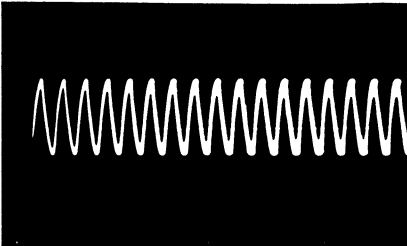
⑪ IC3-80: STOP MODE
2V/Div 5μS/Div



⑪ IC3-3: PLAY MODE
2V/Div 200μS/Div



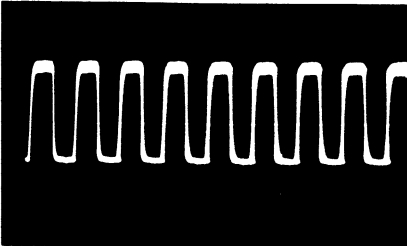
⑭ IC3-8: PLAY MODE
2V/Div 200μS/Div

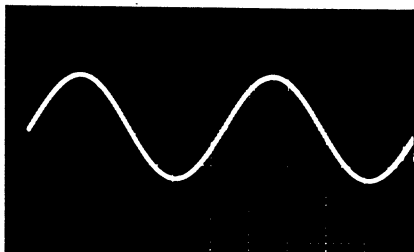
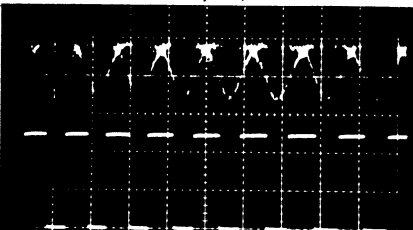
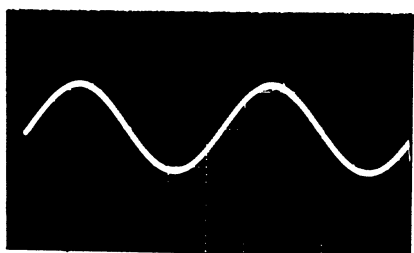
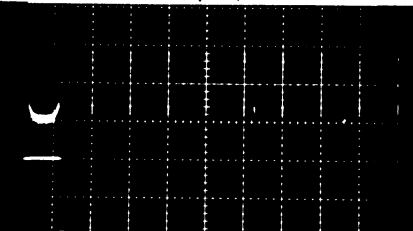
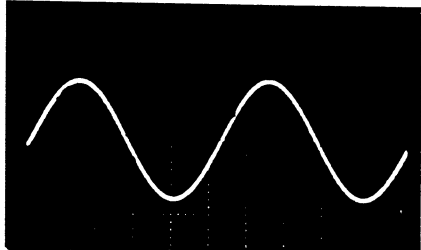
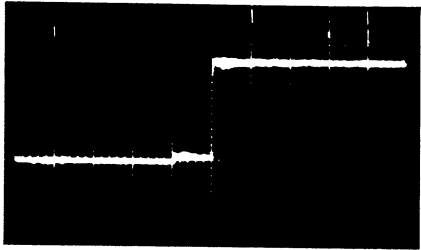
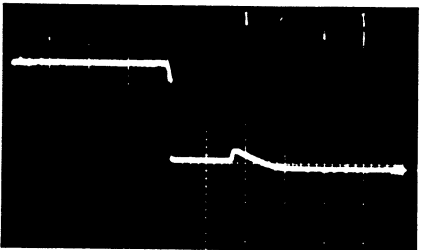


⑪ IC3-3: SEARCH MODE
2V/Div 10mS/Div



⑮ TP2-2: PLAY MODE
2V/Div 200μS/Div



<p>⑮ IC5-9: PLAY MODE 2V/Div 200μS/Div</p> 	<p>⑮ IC1-22: TR OPEN 1mS/Div Upper TP1-1, 1V/Div Lower IC1-22, 2V/Div</p> 	
<p>⑯ IC25-1: PLAY MODE 2V/Div 200μS/Div</p> 	<p>⑯ IC1-21: DFCT 1mS/Div Upper TP1-1, 1V/Div Lower IC1-21, 5V/Div</p> 	
<p>⑰ OUTPUT Lch: PLAY MODE 2V/Div 200μS/Div</p> 		
<p>⑱ IC10-5: POWER ON 2V/Div 500mS/Div</p> 		
<p>⑲ IC10-5: POWER-OFF 2V/Div 100mS/Div</p> 		

5. EXPLODED VIEWS AND PARTS LIST

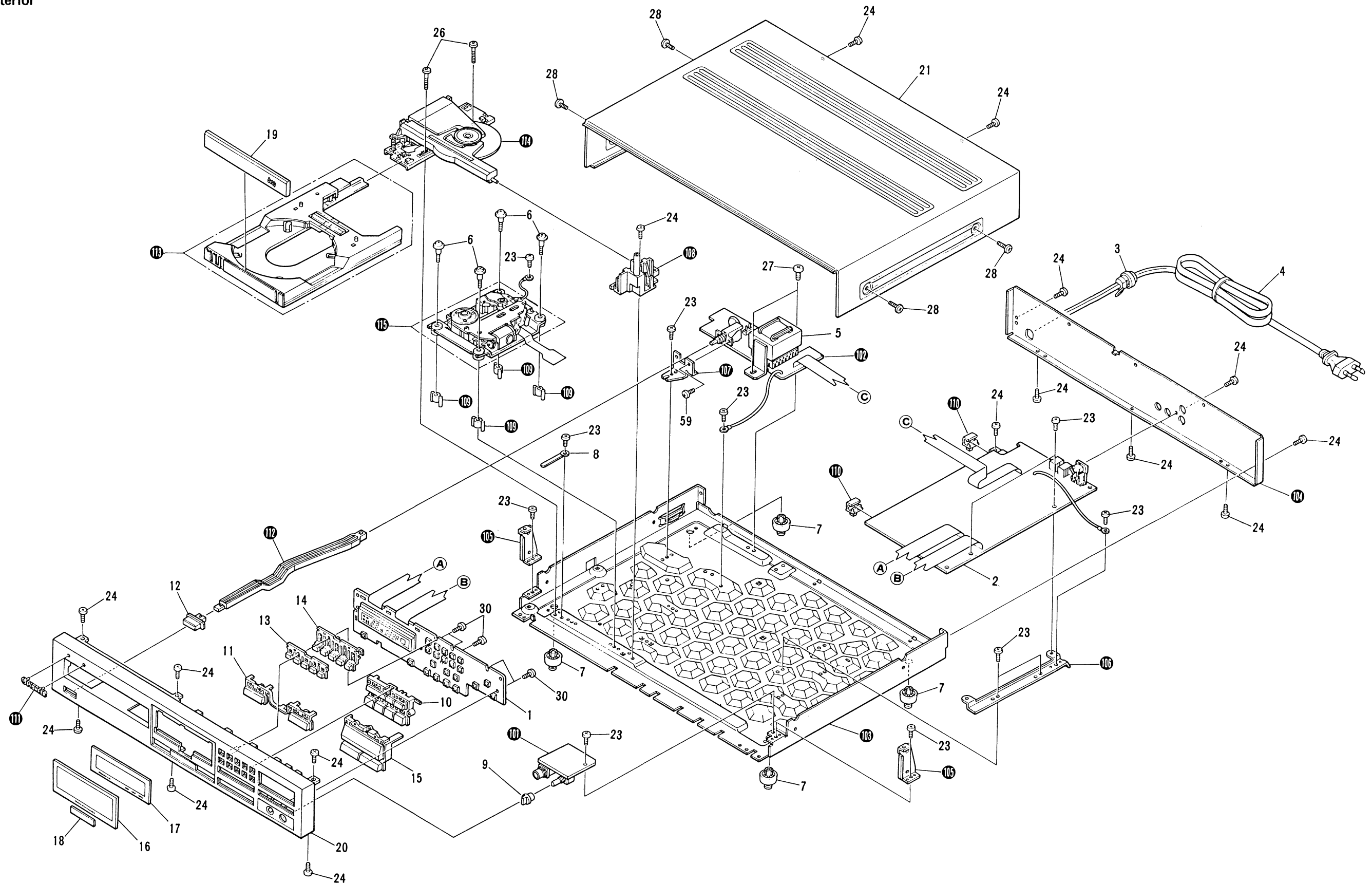
5.1 Exterior

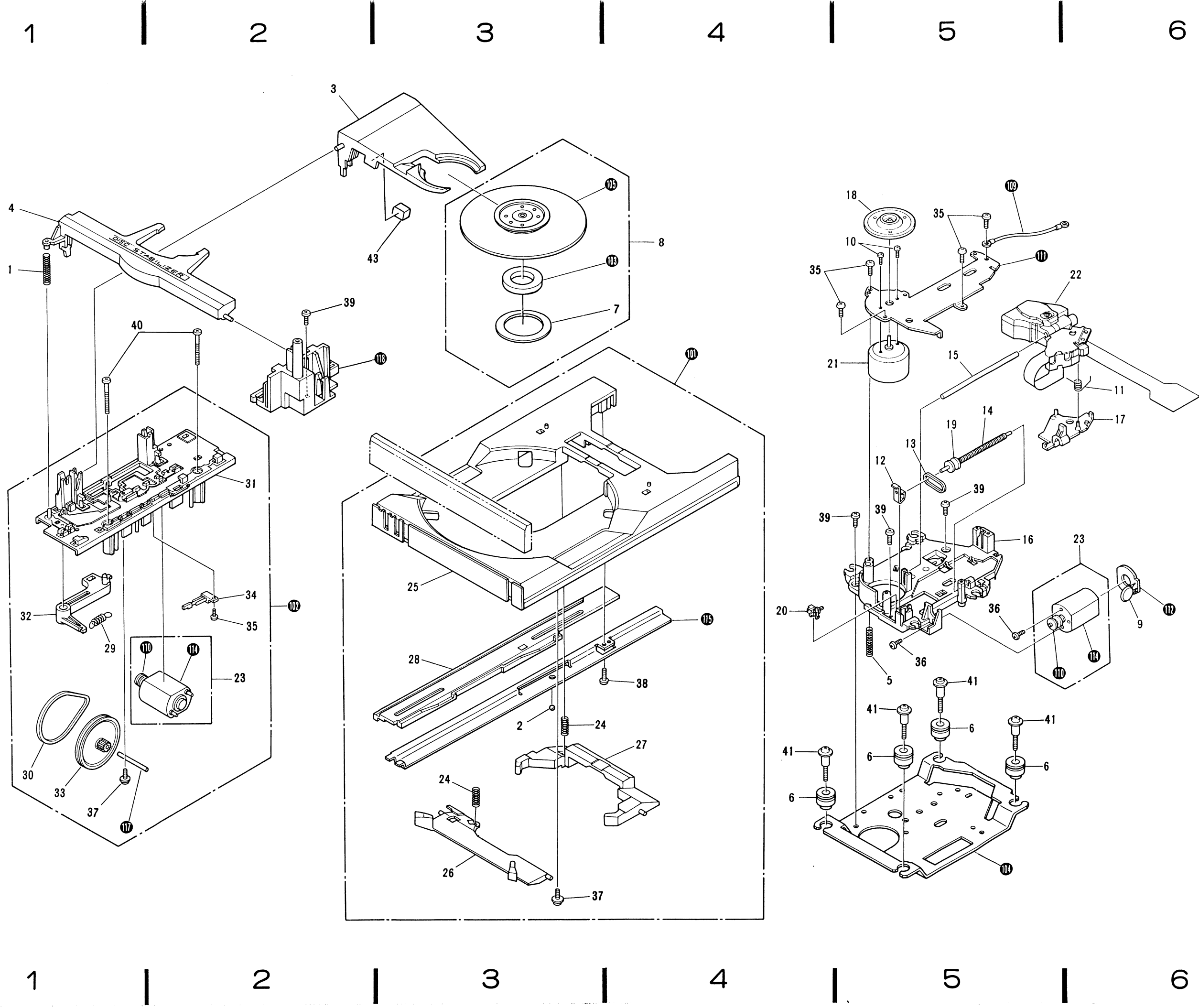
A

B

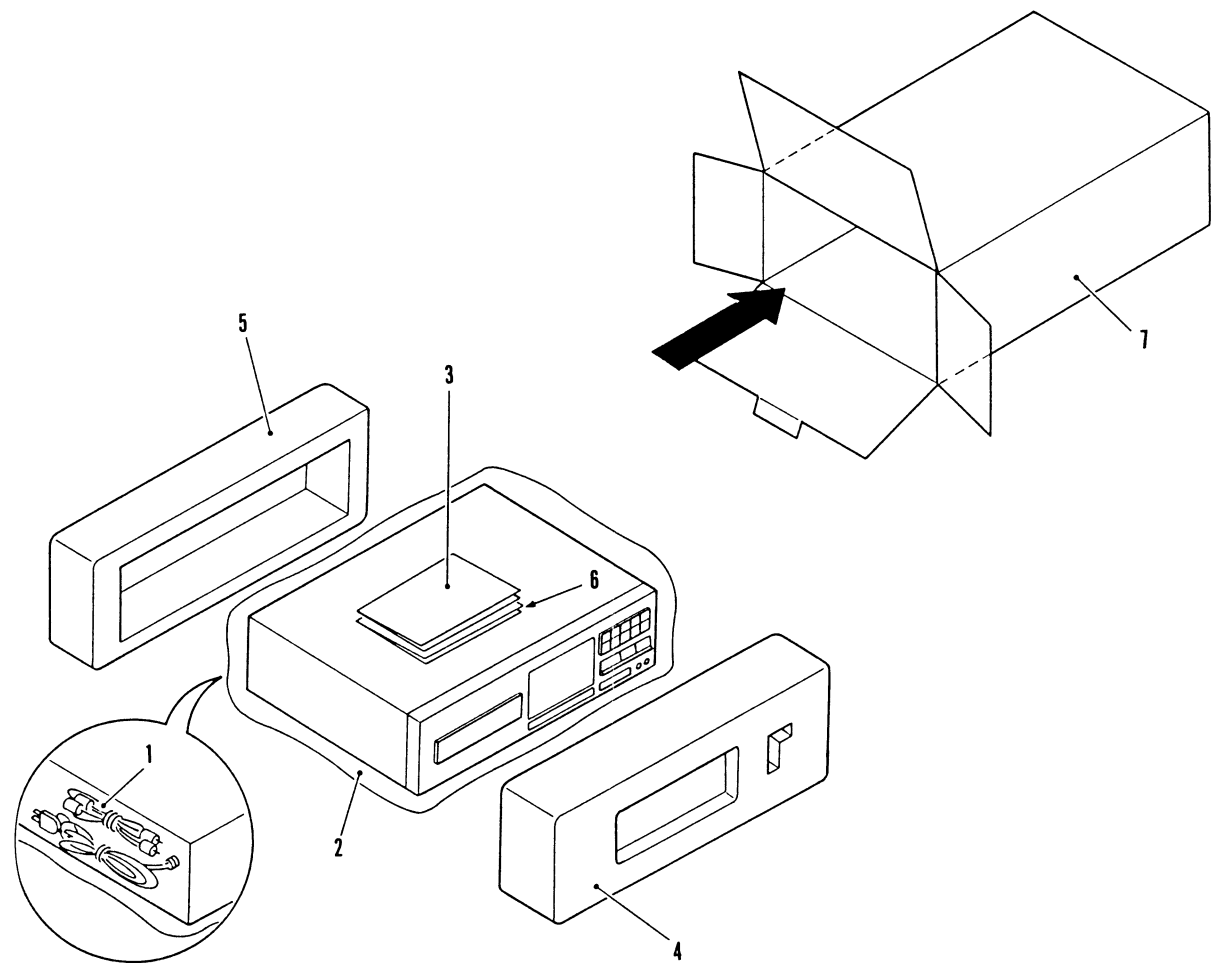
C

D





6. PACKING



Parts List of Packing

Mark	No.	Part No.	Description
	1.	PDE1001 (PDE1002)	Connection cord
	2.	VHL-037	Sheet
	3.	PRE1015	Operating instructions (English/French)
	4.	PHA1013	Protector (F)
	5.	PHA1014	Protector (R)
	6.	PRF1004	Operating instructions (German/Italian)
	7.	PHG1060	Packing case

External appearance of transistors and ICs

CXA1081S

PDE003

2SD1302

CXD1125QZ

PD3092A

CXA1082AS

CXK5816PN

M5218L

NJM79M05FA

ICP-F10

DTA124ES
DTC124ES

NJM78M05FA

LA6510

2SA1048

M51957AL

M5238PF

NJM78L05A

PCM56P
BU4053

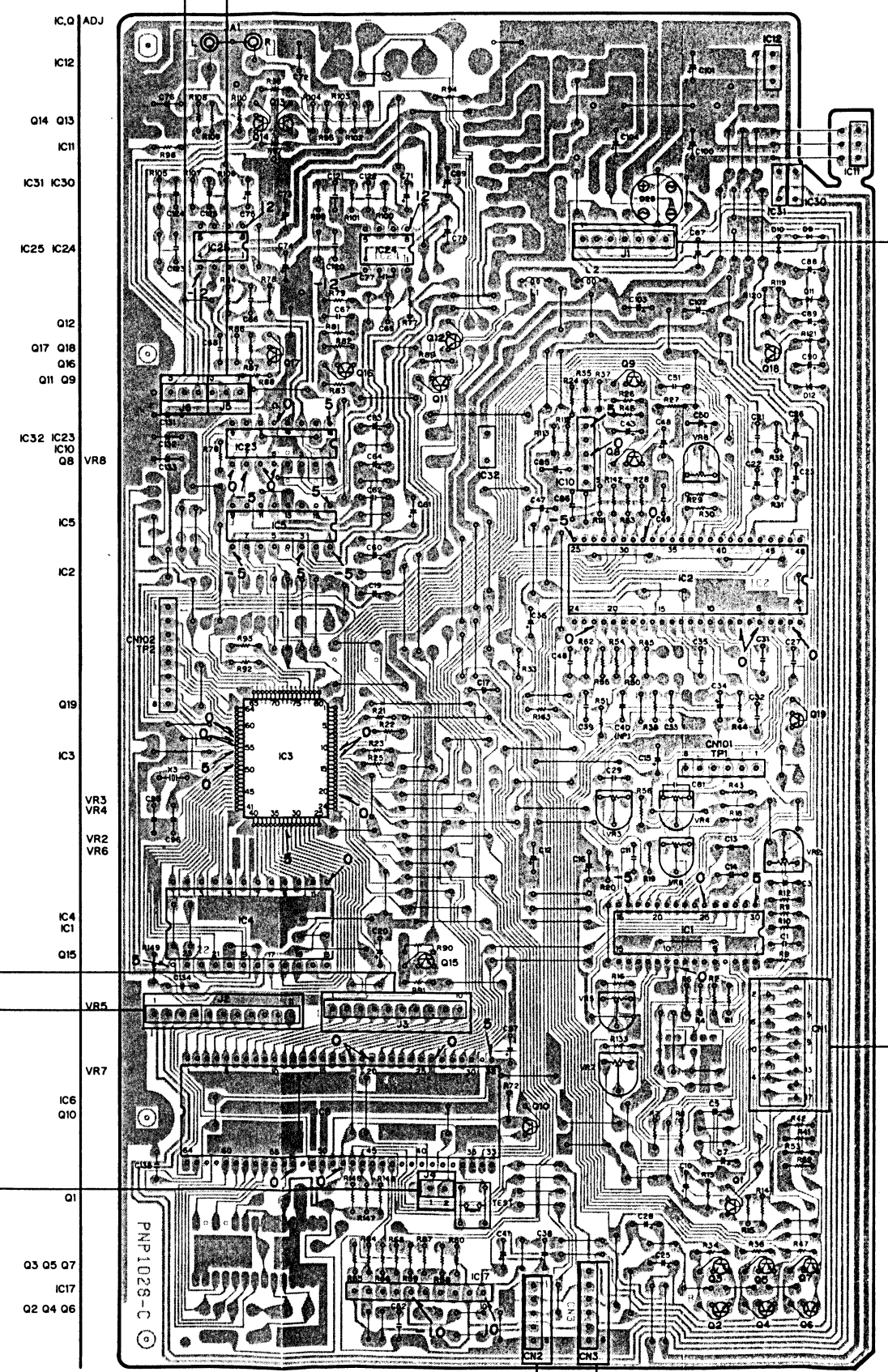
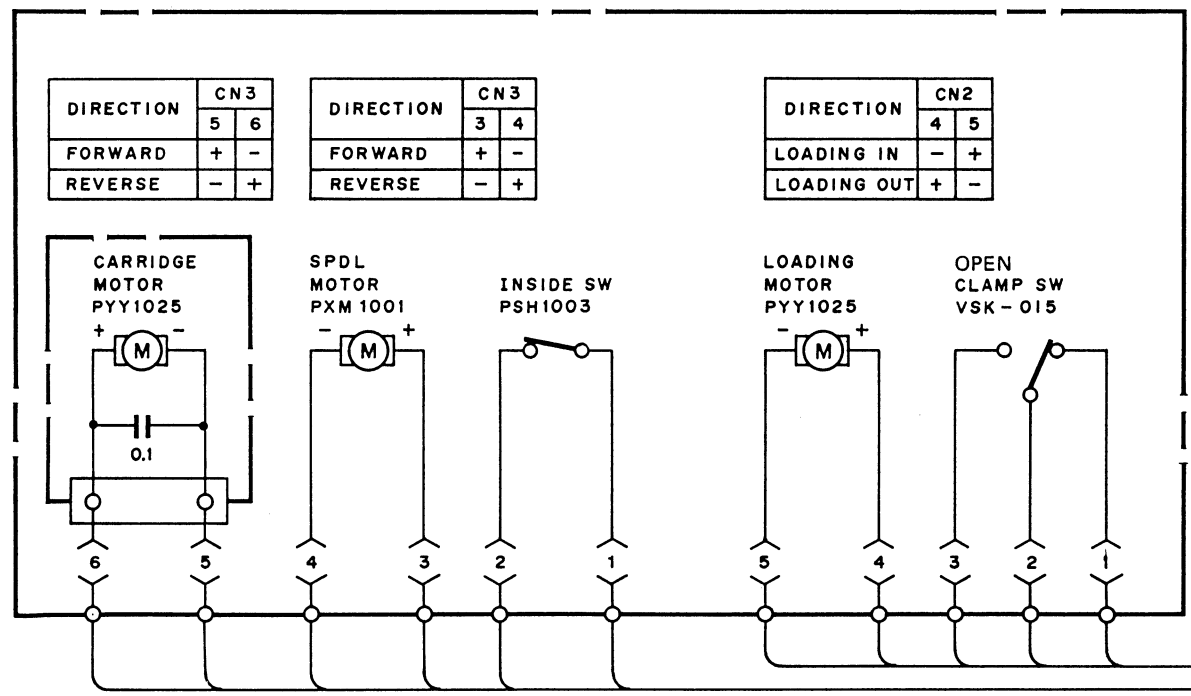
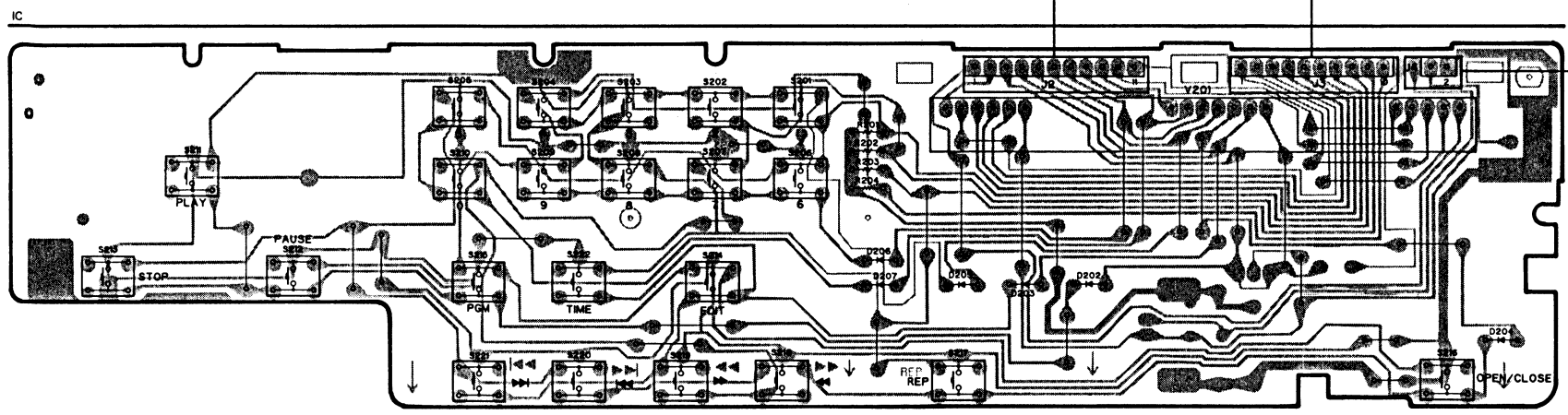
2SA1399
2SC3581

2SA933S
2SC1740S

7. P.C. BOARDS CONNECTION DIAGRAM

MAIN CIRCUIT BOARD ASSEMBLY (PWZ1212)

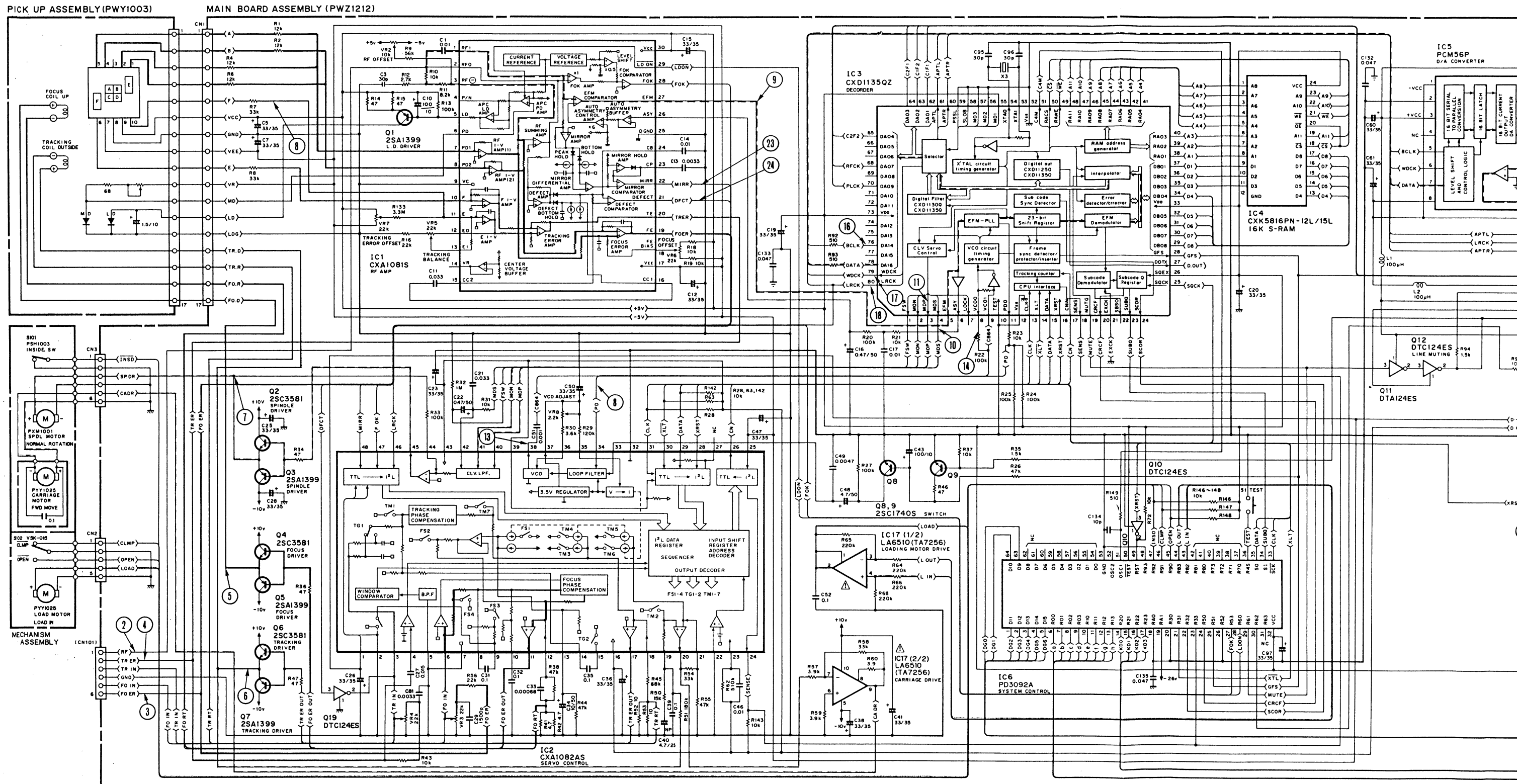
FUNCTION BOARD ASSEMBLY (PWZ1144)

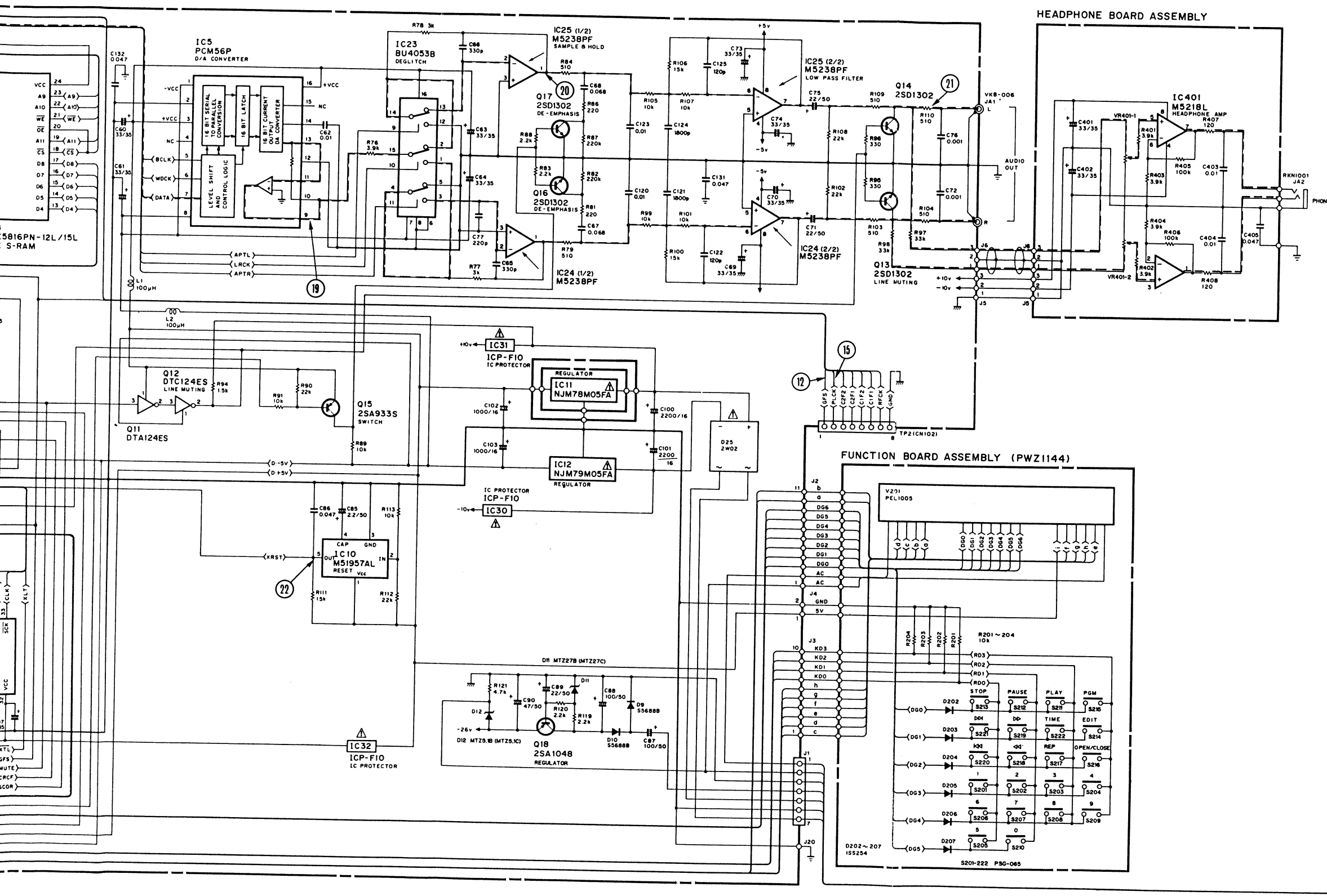


[illegible]

6 | 7 | 8 | 9 | 10 | 11 | 12

8. SCHEMATIC DIAGRAM





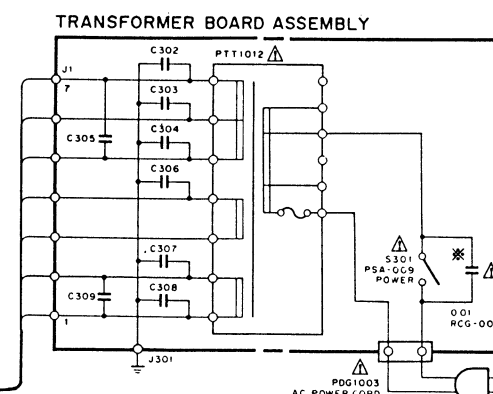
NOTE:
The indicated semiconductors are representative ones only. Other alternative semiconductors may be used and are listed in the parts list.

FOCUS SERVO LOOP _____
 SIGNAL LINE _____
 TRACKING SERVO LOOP _____
 CARIDGE SERVO LOOP _____
 LOADING MOTOR _____
 SPINDLE SERVO LOOP _____

- NOTE:**
- RESISTORS:**
Indicated in Ω , 1/8W & 1/4W, $\pm 5\%$ tolerance unless otherwise noted k; k Ω , M; M Ω , (F); $\pm 1\%$, (G); $\pm 2\%$, (K); $\pm 10\%$, (M); $\pm 20\%$ tolerance
 - CAPACITORS:**
Indicated in capacity (μ F)/voltage (V) unless otherwise noted p; pF. Indication without voltage is 50V except electrolytic capacitor.
 - VOLTAGE, CURRENT:**
□; DC voltage (V) at no input signal
Value in () is DC voltage at rated power.
mA; DC current at no input signal
 - OTHERS:**
➡; Signal route.
⊗; Adjusting point.

The Δ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
 * marked capacitors and resistors have parts numbers.
 The underlined indicates the switch position.

This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.



9. ELECTRICAL PARTS LIST

NOTES:

- Parts without part number cannot be supplied.
- Parts marked by "⊙" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.
- The Δ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- For your parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.
- ★★ **GENERALLY MOVES FASTER THAN ★**
This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.
- When ordering resistors, first convert resistance values into code form as shown in the following examples.

Ex. 1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J = 5%, and K = 10%).

560Ω	56×10^1	561.....	RD1/4PS	5	6	1	J
47kΩ	47×10^3	473.....	RD1/4PS	4	7	3	J
0.5Ω	0R5.....		RN2H	0	5		K
1Ω	010.....		RS1P	0	1	0	K

Ex. 2 When there are 3 effective digits (such as in high precision metal film resistors).

5.62kΩ	562×10^1	5621.....	RN1/4SR	5	6	2	1	F
--------	-------------------	-----------	---------	---	---	---	---	---

Miscellaneous Parts

P.C. BOARD ASSEMBLIES

Mark	Symbol & Description	Part No.
Δ ⊙	Main board assembly	PWZ1212
Δ	Headphone board assembly	
Δ ⊙	Function board assembly	PWZ1144
Δ	Transformer board assembly	

OTHERS

Mark	Symbol & Description	Part No.
Δ	Strain relief	CM-22B
Δ	AC power cord	PDG1003
★★	Spindle motor	PXM1001
★★	Motor assembly (CARRIAGE, LOADING)	PYY1025
★★	Slade switch (INSIDE)	PSH1003
★★	Leaf switch (OPEN/CLMP)	VSK-015
	Pik up assembly	PWY1003

Δ ⊙ Main Board Assembly (PWZ1212)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★★	IC23	BU4053B
★★	IC1	CXA1081S
★★	IC2	CXA1082AS
★★	IC3	CXD1135QZ
★★	IC4	CXK5816PN-12L (CXK5816PN-15L)
Δ ★★	IC30, IC31, IC32	ICP-F10
★★	IC17	LA6510
★★	IC10	M51957AL
★★	IC24, IC25	M5238PF
★★	IC11	NJM78M05FA
★★	IC12	NJM79M05FA
★★	IC5	PCM56P
★★	IC7	PDE003
★★	IC6	PD3092A
★★	Q11	DTA124ES
★★	Q10, Q12, Q19	DTC124ES
★★	Q18	2SA1048
★★	Q1, Q3, Q5, Q7	2SA1399
★★	Q15	2SA933S
★★	Q8, Q9	2SC1740S
★★	Q2, Q4, Q6	2SC3581
★★	Q13, Q14, Q16, Q17	2SD1302
★	D11	MTZ27B (MTZ27C)
★	D12	MTZ5.1B (MTZ5.1C)
★	D9, D10 D25	S5688B 2W02

CAPACITORS

Mark	Symbol & Description	Part No.
	C134	CCCSL10050
	C95, C96, C3	CCCCH300J50
	C16, C22	CEAR47M50
	C52	CGCYX104M25
	C120, C123	CFTXA103J50
	C67, C68	CFTXA683J50
	C131-C133, C135	CKCYF473Z50
	C69, C70, C73, C74	CEAS330M35
	C34	CEAS100M50
	C87, C88	CEAS101M50
	C102, C103	CEAS102M16
	C85	CEAS2R2M50
	C71, C75, C89	CEAS220M50
	C100, C101	CEAS222M16
	C5, C7, C20, C23, C25, C26, C28, C38, C41, C50, C60, C61, C63, C64, C12, C15, C19, C36, C47	CEAS330M35
	C84, C97	CEAS330M35
	C90	CEAS470M50
	C106, C107	CEAS471M25
	C10, C43	CEA101M10
	C48	CEA4R7M50
	C33	CQMA681K50
	C51	CQMA102K50
	C1, C17, C46, C62	CQMA103K50
	C31, C32, C39, C35, C14	CQMA104K50
	C29	CQMA152J50
	C11, C21	CQMA333K50
	C49	CQMA472K50
	C67, C68	CFTXA683J50
	C65, C66	CQSA331J50
	C72, C76	CQSA102J50
	C86	CQMA473J50
	C13	CQMA331J50
	C27	CQMA153K50

RESISTORS

Mark	Symbol & Description	Part No.
★	VR3, VR4, VR5, VR6, VR7	VRTB6VS223
	Semi-fixed resistor (22k)	
★	VR8	VRTS6VS222
	Semi-fixed resistor (2,2k)	
	VR2	VRTB6VS103
	Semi-fixed resistor (10k)	
	R30	RN1/6PQ3601F
	Metal film resistor	
	Other resistors	RD1/6PM□□□J

OTHERS

Mark	Symbol & Description	Part No.
	JA1	2P terminal (AUDIO OUT)
	VKB-006	
★	X3	Crystal resonator
	PSS-012	

△ Headphone Board Assembly

SEMICONDUCTOR

Mark	Symbol & Description	Part No.
★★	IC401	M5218L

CAPACITORS

Mark	Symbol & Description	Part No.
	C401, C402	CEAS330M35
	C403, C404	CKCYF103Z50
	C405	CKCYF473Z50

RESISTORS

Mark	Symbol & Description	Part No.
★	VR401	Variable resistor (PHONES LEVEL)
	PCS1001	
	Other resistors	RD1/6PM□□□L

OTHERS

Mark	Symbol & Description	Part No.
	JA2	Headphone jack (PHONES)
	RKN1001	

△ Transformer Board Assembly

SWITCH

Mark	Symbol & Description	Part No.
△ ★★	S301	Power switch
	PSA-009	

Transformer

Mark	Symbol & Description	Part No.
△ ★	Power transformer (AC220V/240)	PTT1012

CAPACITORS

Mark	Symbol & Description	Part No.
	C302-C309	CKCYF103Z50
△	C301 (0.01μF)	RCG-009

△ ⊙ Function Board Assembly (PWZ1144)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★	D202-D207	1SS254

SWITCHES

Mark	Symbol & Description	Part No.
★★	S201-S222	Tact switch (OPERATION)
	PSG-065	

OTHERS

Mark	Symbol & Description	Part No.
★	V201	Fluorescent tube
	PEL1 005	

10. ADJUSTMENTS

The adjustments for this unit are given below. Adjustments must be made in the order in which they are listed.

● ADJUSTMENTS

1. Tracking error offset, focus offset and RF offset adjustment
2. LD (laser diode) power check
3. Focus lock and spindle lock check
4. Grating adjustment
5. Tracking balance adjustment
6. Tangential adjustment
7. RF level check
8. Focus gain adjustment
9. Tracking gain adjustment
10. VCO free run frequency adjustment

● REQUIRED EQUIPMENT

1. Dual trace oscilloscope
2. Optical power meter
3. Test disc (YEDS-7)
4. Loop gain adjustment filter
5. Signal generator
6. Frequency counter
7. Other regular measuring equipment

● ABOUT THE TEST MODE

All adjustments must be carried out with the unit in the test mode.

How to activate and release the test mode

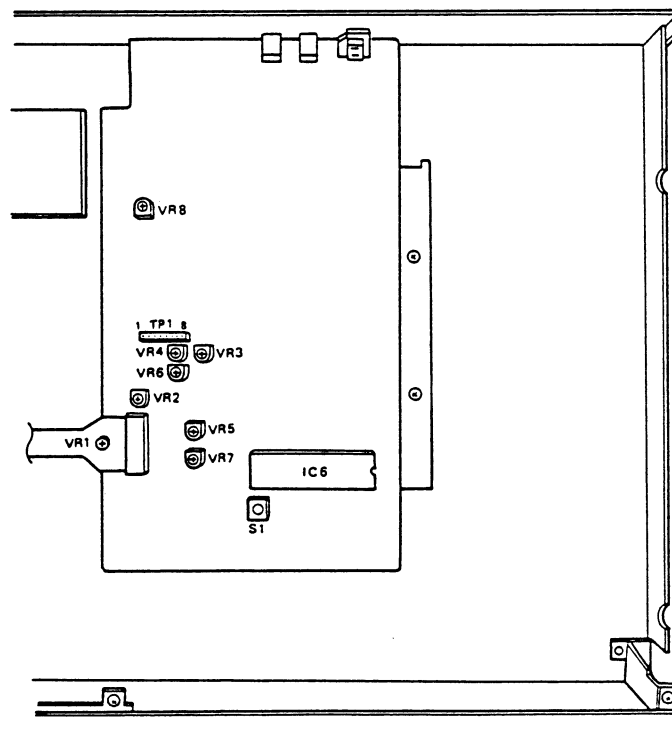
- ① To activate the test mode, turn ON the power switch (S301) with the test mode switch (S1) in the ON position.
- ② The test mode is released by turning the power switch OFF.


The functions of the keys in the test mode are outlined in Table 10-1.

● ADJUSTMENT VRs AND THEIR NAMES

- VR1: Laser power
 VR2: RF offset (RF.OFS)
 VR3: Focus gain (FCS.GAN)
 VR4: Tracking gain (TRK.GAN)
 VR5: Tracking balance (TRK.BAL)
 VR6: Focus offset (FCS.OFS)
 VR7: Tracking offset (TRK.OFS)
 VR8: VCO adjust (VCO.ADJ)

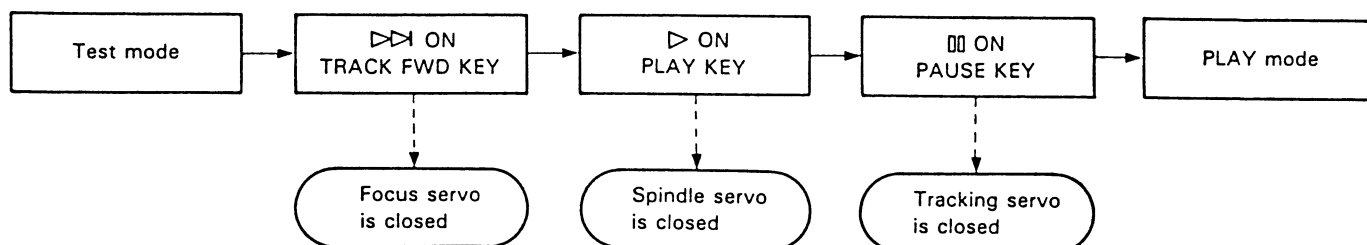
Adjustment Point



In the test mode, the servos must be closed and opened individually. Consequently, the servos must each be closed in the proper sequence (serial sequence) in order to put the machine into the play mode. Note also that the machine will not enter the play mode when the PAUSE () key is pressed.

For example, in order to change from the stop to the play mode, the function keys must be pressed in the following order:

* In the test mode, the servos must be operated in serial sequence.



● KEY FUNCTIONS IN THE TEST MODE








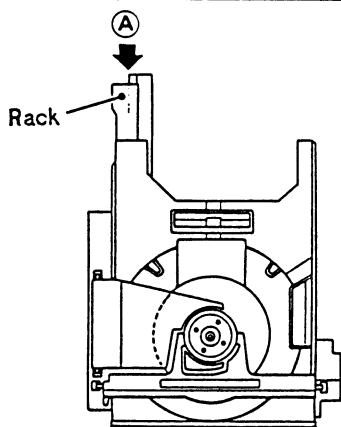
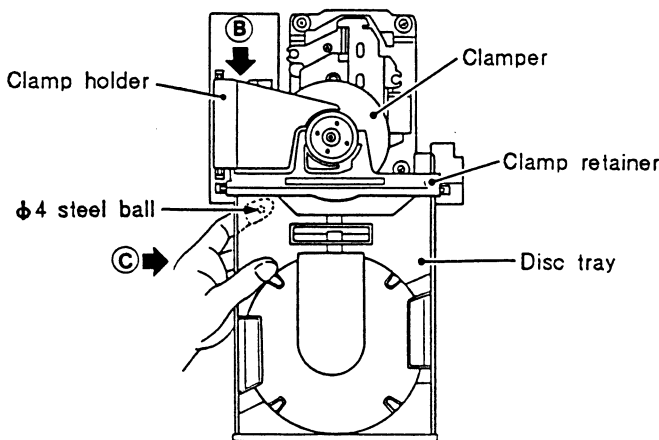
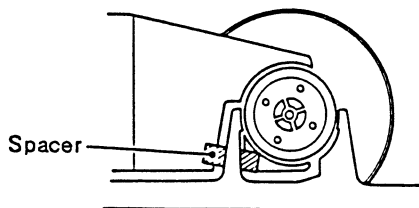
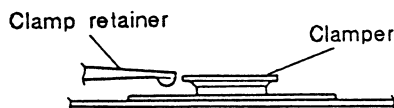
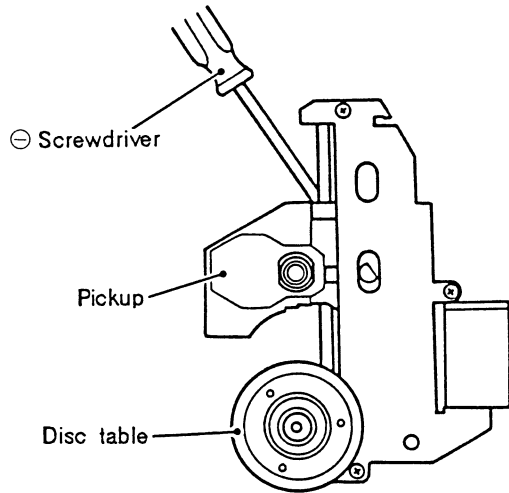
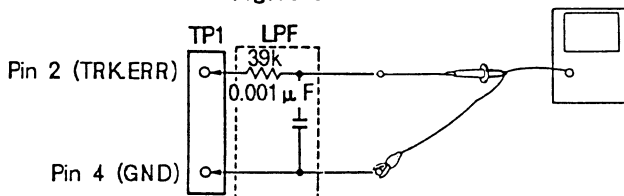
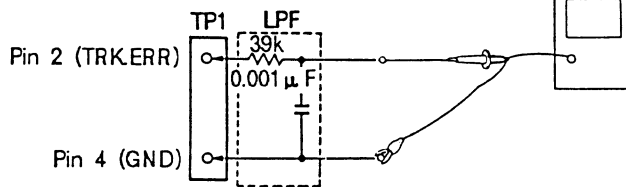
Symbol	Key name	Function in test mode	Description
	TRACK FWD	Focus servo close	Turns ON the laser diode, and raises and lowers the focusing actuator to close the focus servo.
	PLAY	Spindle servo close	Closes the servo in the CLV-A mode after kicking the spindle motor.
	PAUSE	Tracking servo close/open	Acts as a toggle: closes the tracking servo and activates play mode when pressed (provided the focus and spindle servos are closed), at which time the PAUSE indicator illuminates; opens the tracking servo when pressed again.
	MANUAL SEARCH REV	Carriage reverse (moves inward)	Moves carriage quickly (3cm/s) toward innermost track. Be careful not to move too far as there is no safety device to stop the carriage.
	MANUAL SEARCH FWD	Carriage forward (moves outward)	Moves carriage quickly (3cm/s) toward outermost track. Be careful not to move too far as there is no safety device to stop the carriage.
	STOP	Stop	Stops all servos and returns system to its initial state.
	OPER/CLOSE	Disc tray open/close	Opens and closes the disc tray. However, pickup does not return to rest on OPEN, and it remains stationary on CLOSE.

Table 10-1.

Step No.	Oscilloscope Setting		Test Points	Adjusting Points	Check items/ Adjustment specifications	Adjustment procedure
	V	H				
1	Tracking error offset, focus offset and RF offset adjustment					
			TP1 Pin 2 (TRK. ERR)	VR5 (TRK. BAL) VR7 (TRK. OFS)	Tracking error offset 45° 0V±50mV	<ul style="list-style-type: none">● Put unit in the test mode (see page 35).● Set VR5 TRK.BAL (tracking balance) to the position about 45° to the left of center.● Adjust VR7 TRK.OFS(tracking offset) so that the TRK.ERR (tracking error) voltage at TP1 pin 2 becomes 0V ± 50mV.
			TP1 Pin 6 (FCS. ERR)	VR6 (FCS.OFS)	Focus offset 0V ± 50mV	<ul style="list-style-type: none">● Adjust VR6 FCS.OFS (focus offset) so that the FCS.ERR (focus error) voltage at TP1 pin 6 becomes 0V ± 50mV.
			TP1 Pin 1 (RF. OUTPUT)	VR2 (RF.OFS)	RF offset 100mV ± 50mV	<ul style="list-style-type: none">● Adjust VR2 RF.OFS (RF offset) so that the RF output voltage at TP1 pin 1 becomes 100mV ± 50mV. <p>Note: When adjusting the tracking error offset, always perform "5. Tracking Balance Adjustment."</p>
2	LD (laser diode) power check					
				VR1	Specification: 0.13mW ± 0.01mW	<ul style="list-style-type: none">● Put unit in the test mode (see page 35).● Press the TRACK FWD (▷▷) key to turn ON the laser diode.● Place the sensor of the optical power meter directly above the objective lens and confirm that LD power is 0.13mW ± 0.01mW.● If the reading is not conforms specification, adjust VR1 (LD power adjust) so that the laser diode power conforms to specification.
3	Focus lock and spindle lock check					
	V 0.5V/div	H 100msec/ div	TP1 pin1 (RF output)		RF signal is output Forward (clockwise) rotation	<ul style="list-style-type: none">● Set the test disc.● Put unit in the test mode (see page 35).● Press the MANUAL SEARCH FWD (▷▷) key to move the pickup to the center of the disc.● Observe the output of TP1 pin 1 (RF output) on the oscilloscope. Confirm that the RF signal is output after the TRACK FWD (▷▷) key is pressed.● Press the PLAY (▷) key and confirm that the disc rotates at constant speed (approx. 30 rpm near center of disc) in the forward (clockwise) direction; disc may not run away or rotate counterclockwise.

Step No.	Oscilloscope Setting		Test Points	Adjusting Points	Check items/ Adjustment specifications	Adjustment procedure
	V	H				
4	Grating adjustment (1)					
	<div></div> <p>Fig. 10-1</p> <div></div> <p>Fig. 10-2</p>				<p>Remove the disc tray before beginning this adjustment.</p> <ul style="list-style-type: none">● Removal of the disc tray <ol style="list-style-type: none">1. Press the rear edge of the rack, marked ① in Fig. 10-1, while pulling the disc tray out to the position where it catches, illustrated in Fig. 10-2.2. While pulling the clamp holder ② (see Fig. 10-2) upward with the right hand, hold the tray as indicated by ③ in the left hand and pull it outward. Take care not to allow the φ4 steel ball to fall (we recommend holding the ball in place with the left index finger while extracting the tray).	
	<div></div> <p>Fig. 10-3</p>					
	<div></div> <p>Fig. 10-4</p>					

Step No.	Oscilloscope Setting		Test Points	Adjusting Points	Check items/ Adjustment specifications	Adjustment procedure					
	V	H									
	<div></div> <p>Fig.10-5</p> <div></div> <p>Fig. 10-6</p> <table><tr><td>0.5V/div</td><td>5ms/div</td><td>TP1 Pin 2 TRK. ERR</td><td>Grating adjusting screw Grating adjusting screw</td><td>Null point Max. amplitude</td></tr></table>					0.5V/div	5ms/div	TP1 Pin 2 TRK. ERR	Grating adjusting screw Grating adjusting screw	Null point Max. amplitude	<ul style="list-style-type: none">● Put unit in the test mode (see page 35).● Press the MANUAL SEARCH FWD (▷▷) key to move the pickup to the vicinity of what would be the center of the disc. Position the pickup so its grating adjusting screw is visible through the elongated hole on the spindle motor side of the servo mechanism base plate.● As shown in Fig. 10-5, insert a (slotted) screwdriver from the rear of the mechanism and check that the grating adjusting screw can be rotated.● Mount the test disc; be sure to insert a 3 — 5 mm spacer (if no spacer is available, use a hex wrench) between the clamp holder and clamp retainer, as shown in Fig. 10-3.● Confirm that the clamper and the clamp retainer are not contacting one another (Fig. 10-4).● Press the TRACK FWD (▷▷) and the PLAY (▷) keys sequentially to close the focus and spindle servos (do not close the tracking servo).● Insert a 4kHz-cutoff low pass filter between the oscilloscope and TP1 pins 2 (TRK.ERR) and 4 (GND) as shown in Fig. 10-6 and observe the waveform of TP1 pin 2 (tracking error) on the oscilloscope.● Turn the grating adjusting screw with the ⊖ screwdriver to find the null point (see Photo 10-1).● Next, slowly rotate the screw clockwise and adjust to the point where the waveform (tracking error signal) first achieves its maximum amplitude (see Photo 10-3). <p>Note: Avoid applying pressure to the ⊖ screwdriver while adjusting the screw. Doing so causes the pickup to move inward, making adjustment more difficult.</p> <ul style="list-style-type: none">● Lastly, remove the low pass filter and confirm that the tracking error signal p-p voltage does not greatly vary when the pickup is moved to the inner-most and outer-most tracks of the disc. If the levels diverge by $\pm 10\%$ or more, re-adjust the maximum error amplitude point by rotating the grating adjusting screw.
0.5V/div	5ms/div	TP1 Pin 2 TRK. ERR	Grating adjusting screw Grating adjusting screw	Null point Max. amplitude							



Step No.	Oscilloscope Setting		Test Points	Adjusting Points	Check items/ Adjustment specifications	Adjustment procedure
	V	H				
						<p>Re-mount the disc tray according to the following procedure when the grating adjustment is complete.</p> <ol style="list-style-type: none"> 1. Remove the disc and the spacer. 2. While lifting the clamp holder [marked ⑧ in Fig. 10-2] with the right hand, hold the tray in the left hand as indicated by ③ and slide the slide base into the hard resin fittings on the loading base as shown in Fig. 10-7 to re-insert the disc tray. <p>At this time, be sure to hold the steel ball in place with the index finger of the left hand. Also, be careful that the front panel is not damaged by the slide base and bearing of the steel ball's bearing (in the slide base) coming into contact with the panel.</p> <ol style="list-style-type: none"> 3. Insert the slide base so that it fits into the two hard resin fittings at the rear of the loading base (see Fig. 10-8). 4. Insert the tray all the way.

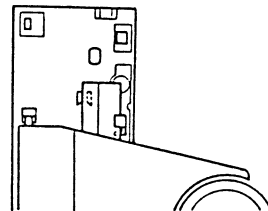
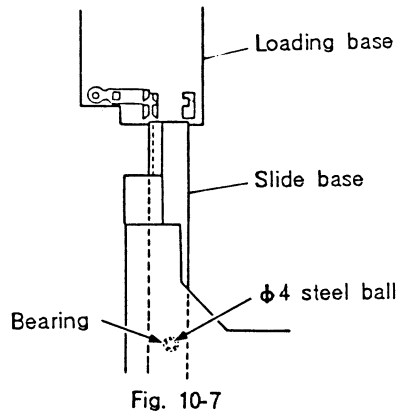


Fig. 10-8

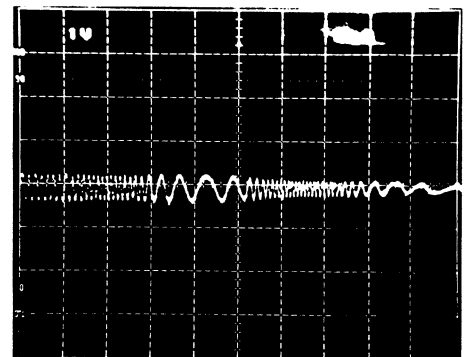


Photo 10-1 Null point

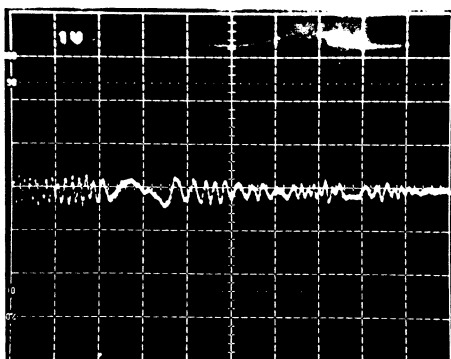


Photo 10-2 This is not the null-point waveform.

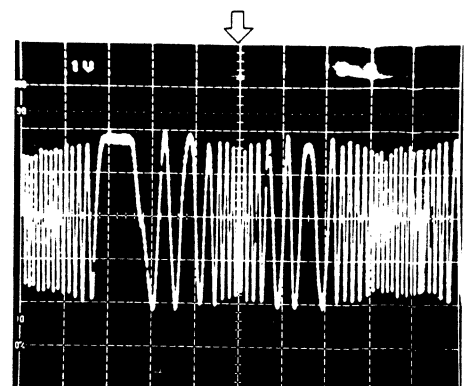
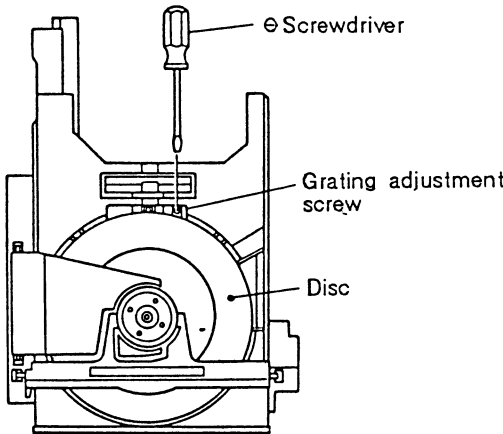
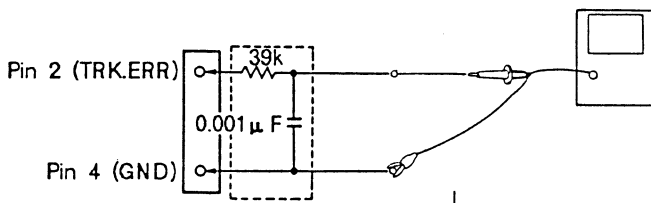
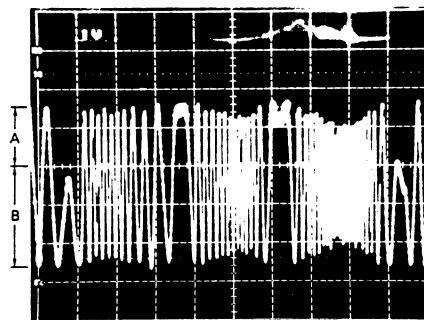
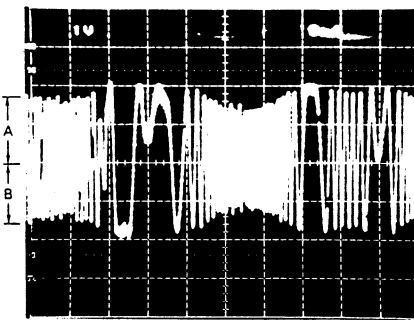
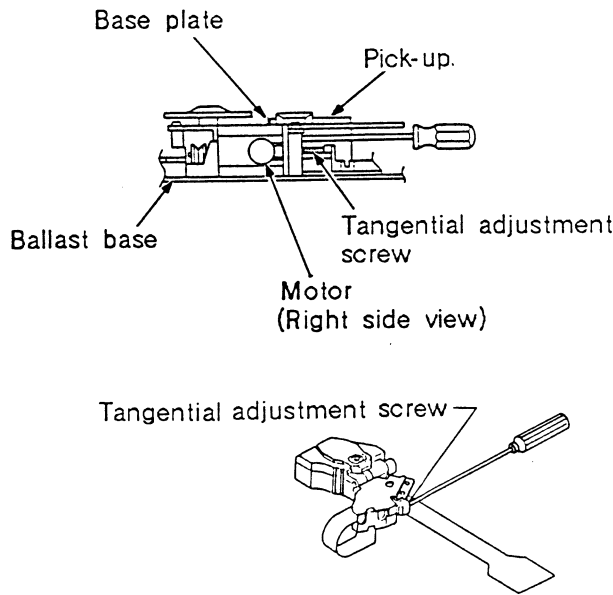
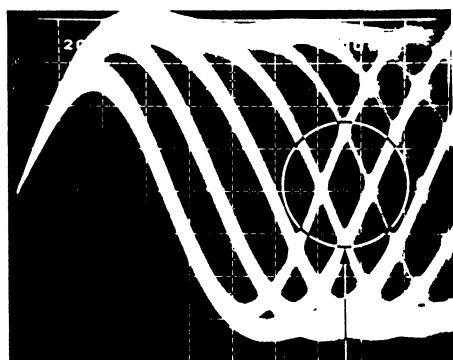


Photo 10-3 Maximum amplitude

Step No.	Oscilloscope Setting		Test Points	Adjusting Points	Check items/ Adjustment specifications	Adjustment procedure				
	V	H								
4	Grating Adjustment (2) (using discs with a recording time of 60 min. or more)									
<div><div><p>Fig.10-9</p></div><div><table><tr><td>0.5V/div</td><td>5ms/div</td><td>TP1 Pin 2 (TRK.ERR)</td><td>Grating Grating</td><td>Null point Maximum amplitude</td></tr></table></div><div><p>Fig.10-10</p></div></div> <div><p>Note: This adjustment can only be performed with a disc having pits up to R115mm, not with the Test Disc (YEDS-7).</p><ul style="list-style-type: none">● Put unit in the test mode (see page 35).● Load the test disc, shift the pickup to the outer periphery so that the pickup grating adjustment hole is visible from the pit surface of the disc or from the hole in the servo mechanism (see Fig. 10-9).● Press the TRACK FWD key (▷▷) and PLAY key (▷) in sequence to turn on the focus servo and spindle servo (do not turn on the tracking servo).● Observe the TRK.ERR (tracking error) waveform at TP1 pin 2 on an oscilloscope, inserting a 4kHz low-pass filter (see Fig. 10-10).<p>● Insert a ⊖ screwdriver into the grating hole, turn and find the null point (see Photo 10-1).</p><p>● Next, slowly turn the screwdriver clockwise from the null point and adjust until the waveform (tracking error signal) reaches maximum amplitude (see Photo 10-3).</p><p>Note: Use caution since inserting the ⊖ screwdriver forcefully will cause the pickup unit to float upward.</p><ul style="list-style-type: none">● Finally, make sure that there is no major fluctuation in the p-p voltage of the tracking error signal (do not insert the cutoff 4kHz low-pass filter) when the pickup is shifted to the inner periphery and when the pickup is shifted to the outer periphery. If there is a difference of more than ±10% again rotate the grating adjustment screw and adjust the tracking error signal to maximum.</div>						0.5V/div	5ms/div	TP1 Pin 2 (TRK.ERR)	Grating Grating	Null point Maximum amplitude
0.5V/div	5ms/div	TP1 Pin 2 (TRK.ERR)	Grating Grating	Null point Maximum amplitude						

Step No.	Oscilloscope Setting		Test Points	Adjusting Points	Check items/ Adjustment specifications	Adjustment procedure
	V	H				
5	Tracking balance adjustment					
	0.5V/div	5ms/div	TP1 Pin 2 (TRK. ERR)	VR5 (TRK.BAL)		<ul style="list-style-type: none">● Load the test disc.● Put unit in the test mode (see page 35).● Press the MANUAL SEARCH FWD (▷▷) key to position the pickup near the center of the disc.● Press the TRACK FWD (▷▷) and PLAY (▷) keys sequentially to cause the disc to rotate.● Observe TP1 pin 2 TRK.ERR (tracking error) on the oscilloscope and adjust VR5 TRK.BAL(tracking balance) to eliminate the DC elements from the tracking error signal.
						
	Photo 10-4 DC elements mixed in signal					Photo 10-5 DC elements eliminated
6	Tangential adjustment					
						<ul style="list-style-type: none">● Put unit in the test mode (see page 35).● Open the tray and load the test disc.● Press the MANUAL SEARCH FWD (▷▷) key to position the pickup near the center of the disc.● Insert a hex wrench into the tangential adjustment screw section from the rear of the mechanism.● Close the tray. <p>Note: Do not use an L-shaped hex wrench. Use one such as shown to the left. Using an L-shaped hex wrench can cause the tray to come loose (see page 38 4. Grating Adjustment (1)).</p>
	Fig.10-11					

Step No.	Oscilloscope Setting		Test Points	Adjusting Points	Check items/ Adjustment specifications	Adjustment procedure
	V	H				
		200ns	TP1 Pin 1 RF output	Tangential adjustment screw	Sharpest possible eye pattern	<ul style="list-style-type: none"> ● Press the TRACK FWD (▶▶), PLAY (▶), and PAUSE (⏏) keys sequentially to close the all servos (pause indicator will illuminate). ● Observe TP1 pin 1 (RF output) on the oscilloscope and adjust the tangential adjustment screw to achieve the sharpest possible eye pattern. ● The point to which the adjusting screw should be set lies about halfway between the points at which the eye pattern becomes most blurred when the screw is rotated clockwise and counterclockwise. When the whole waveform becomes clear, concentrate on sharpening the fine lines forming the diamond at the center of the eye pattern (see Photo 10-8). Adjust until the fine lines on all four sides of the diamond are both sharply defined and dense, as shown in Photo 10-6. <div data-bbox="957 1048 1460 1272"> <p>TP1</p> <p>Pin 1 (RF)</p> <p>Pin 4 (GND)</p> </div> <p>Fig. 10-12</p> <p>Note: Use a hex wrench to raise the pickup somewhat while making this adjustment.</p>



Part to be observed

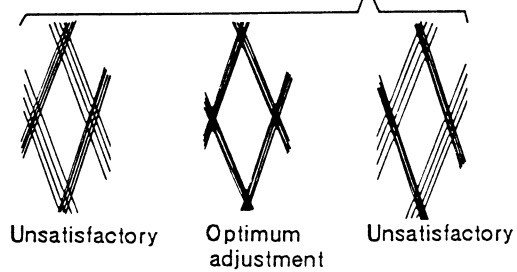


Photo 10-6



Photo 10-7



Photo 10-8

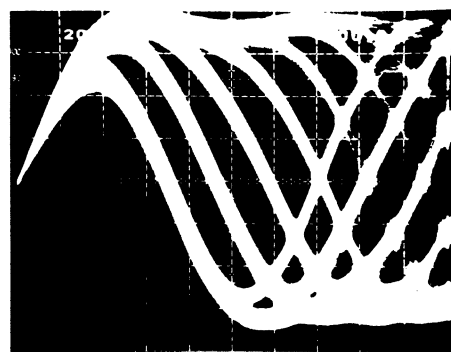


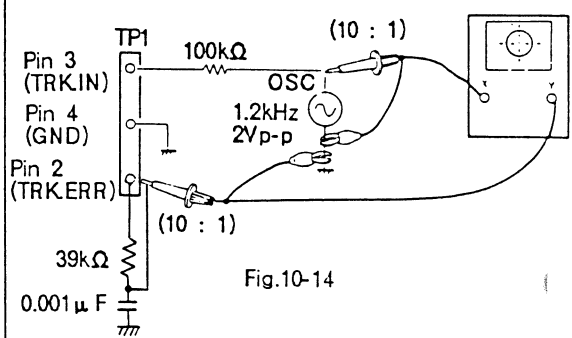
Photo 10-9

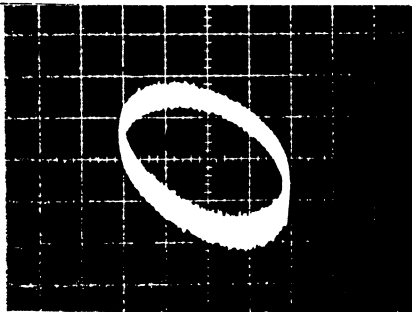
Step No.	Oscilloscope Setting		Test Points	Adjusting Points	Check items/ Adjustment specifications	Adjustment procedure
	V	H				
7	RF level check					
				VR1 (Laser power)	2.0V ± 0.6V	<ul style="list-style-type: none"> ● Put unit in the test mode (see page 35). ● Connect the oscilloscope to TP1 pin 1 (RF output), play the test disc, and measure the P-P voltage of the RF waveform. ● Check that voltage is 2.0 ± 0.6V. ● When 2.6V is exceeded, adjust VR1 so that 2.0V ± 0.6V is obtained.
8	Focus gain adjustment					
	20mV/div 5mV/div CH1(X), CH2(Y) (prove 10:1)	X-axis TP1 Pin 5 (FCS. IN) Y-axis TP1 Pin 6 (FCS. ERR)	VR3 (FCS. GAN)	Phase difference of 90°	<ul style="list-style-type: none"> ● With the oscillator power turned OFF, connect the oscilloscope and oscillator as shown in Fig. 10-13. ● Put unit in the test mode (see page 35). ● Press the TRACK FWD (▶▶), PLAY (▶), and PAUSE (⏏) keys sequentially to activate the focus, spindle, and tracking servos. ● Turn ON the power to the oscillator and set it to output a 1.2kHz 1Vp-p signal. <p>Note: Some oscillators discharge a DC voltage when turned on. It is therefore recommended that the oscillator be connected after it has been turned on.</p> <ul style="list-style-type: none"> ● Adjust VR3 FCS.GAN(focus gain) so that the Lissajous's figure becomes a horizontal circle (phase difference of 90°). 	<p>Fig. 10-13</p>

Photo 10-10

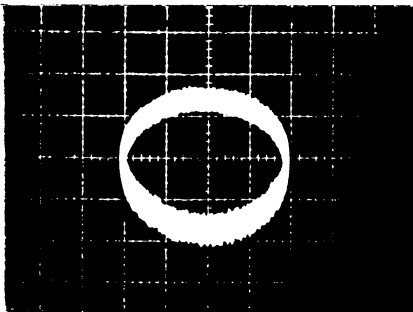
Photo 10-11

Photo 10-12

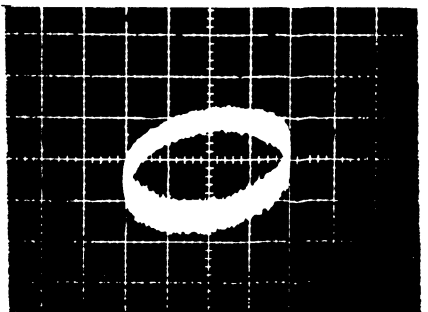
Step No.	Oscilloscope Setting		Test Points	Adjusting Points	Check items/ Adjustment specifications	Adjustment procedure
	V	H				
9	Tracking gain adjustment					
	50mV/div 5mV/div CH1(X), CH2(Y) (prove 10:1)	X-axis TP1 Pin 3 (TRK. IN) Y-axis TP1 Pin 2 (TRK. OUT)	VR4 (TRK.GAN)	Phase difference of 90°	<ul style="list-style-type: none">● With the oscillator power turned OFF, connect the oscilloscope and oscillator as shown in Fig. 10-14.● Put unit in the test mode (see page 35).● Press the TRACK FWD (▷◁), PLAY (▷), and PAUSE (⏏) keys sequentially to activate the focus, spindle, and tracking servos.● Turn ON the power to the oscillator and set it to output a 1.2kHz 2Vp-p signal. <p>Note: Some oscillators discharge a DC voltage when turned on. It is therefore recommended that the oscillator be connected after it has been turned on.</p> <ul style="list-style-type: none">● Adjust VR4 TRK.GAN (tracking gain) so that the Lissajous's figure becomes a horizontal circle (phase difference of 90°). 	



Gain overcompensated
Photo 10-13



Gain optimal
Photo 10-14



Gain undercompensated
Photo 10-15

Step No.	Oscilloscope Setting		Test Points	Adjusting Points	Check items/ Adjustment specifications	Adjustment procedure
	V	H				
10	VCO free-run adjustment					
			TP2 Pin 2	VR8 (VCO.ADJ)	4.375 ±0.025MHz	<ul style="list-style-type: none">● Put unit in the test mode (see page 35).● Short the ASY and GND jumper with a screwdriver or similar tool (see Fig. 10-15).● Connect a frequency counter capable of measuring frequencies of 10MHz and above to TP2 pin 2.● Adjust VR8 (VCO adjust) so that the frequency counter reading becomes 4.375 ± 0.025MHz.
11	Method for confirming focus error					
			TP1 Pin 6 (FCS. ERR)			<ul style="list-style-type: none">● Put unit in the test mode (see page 35).● Ground TP1 pin 5 FCS.IN (focus in) to GND.● Observe the waveform output by TP1 pin 6 FCS.ERR (focus error) when the TRACK FWD (▶▶) key is pressed.

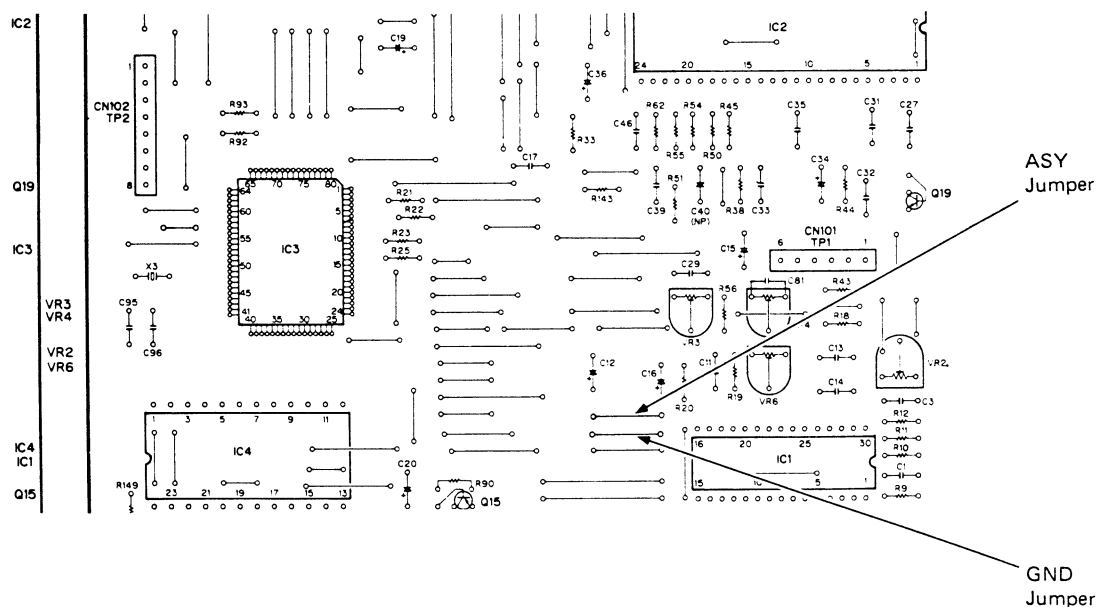


Fig. 10-15 ASY and GND Jumper position